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DOCKET NO.: 217994US3PCT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

IN RE APPLICATION OF: Michael YOUNG et al.

SERIAL NO.: NEW U.S. PCT APPLICATION

FILED: HERewith

INTERNATIONAL APPLICATION NO.: PCT/GB00/02588

INTERNATIONAL FILING DATE: July 5, 2000

FOR: METHOD AND APPARATUS FOR FOCUSsing ULTRASONIC ENERGY

REQUEST FOR PRIORITY UNDER 35 U.S.C. 119
AND THE INTERNATIONAL CONVENTION

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

In the matter of the above-identified application for patent, notice is hereby given that the applicant claims as priority:

<u>COUNTRY</u>	<u>APPLICATION NO</u>	<u>DAY/MONTH/YEAR</u>
Great Britain	9915707.5	05 July 1999


Certified copies of the corresponding Convention application(s) were submitted to the International Bureau in PCT Application No. PCT/GB00/02588.

Respectfully submitted,
OBLON, SPIVAK, McCLELLAND,
MAIER & NEUSTADT, P.C.



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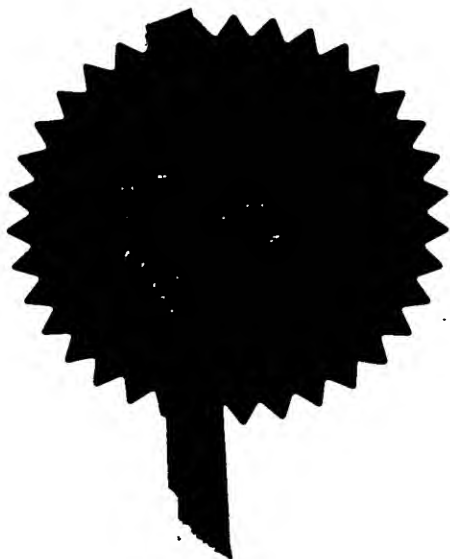
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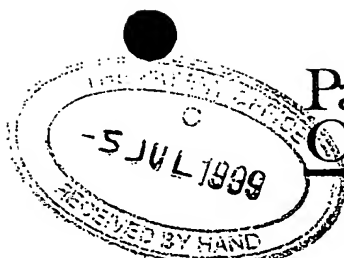
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R. McHorney

Signed

Dated 14 July 2000



The
Patent
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Request for grant of a patent

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The Patent Office

Cardiff Road
Newport
Gwent NP9 1RH

1. Your reference

TMG/P70537

2. Patent application number

(The Patent Office will fill in this part)

9915707.5

5 JUL 1999

3. Full name, address and postcode of the or of each applicant (underline all surnames)

MICHAEL JOHN RADLEY YOUNG 658289/4001
and
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TQ13 7JX

Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

4. Title of the invention

METHOD AND APPARATUS FOR FOCUSED TREATMENT
OF SUBCUTANEOUS BLOOD VESSELS

5. Name of your agent (if you have one)

T. M. GREGORY & CO

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

26 CYRIL STREET
NORTHAMPTON
NN1 5EL

Patents ADP number (if you know it)

43232001

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Country

Priority application number
(if you know it)

Date of filing
(day / month / year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day / month / year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

No

a) any applicant named in part 3 is not an inventor, or

b) there is an inventor who is not named as an applicant, or

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See note (d))

Patents Form 1/77

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Continuation sheets of this form

Description

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Claim(s)

Abstract

Drawing(s)

1

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Statement of inventorship and right to grant of a patent (Patents Form 7/77)

Request for preliminary examination and search (Patents Form 9/77)

Request for substantive examination (Patents Form 10/77)

Any other documents (please specify)

11. I/We request the grant of a patent on the basis of this application.

Signature

T.M. GREGORY & CO

Date @ 2 July 99

12. Name and daytime telephone number of person to contact in the United Kingdom

T.M. Gregory 01604 632436

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METHOD AND APPARATUS FOR FOCUSED TREATMENT OF SUBCUTANEOUS BLOOD VESSELS

The present invention relates to a method and apparatus for treatment of subcutaneous blood vessels comprising a non-invasive ultrasonic focused treatment.

It is well known that fine arteries and veins may become visible in quite random areas closely beneath the dermis. Where these are visible through the dermis in a localised area, these arteries or veins may constitute a serious visual skin blemish.

It is known to remove or treat such blood vessels either using laser energy or by forms of invasive surgery so that the blood supply to that particular part of the vascular system is permanently interrupted and the unsightly blemish may be removed.

However, such known methods of treatment may cause collateral damage to the tissue of the patient being treated or may require lengthy recovery periods.

It is an object of the present invention to provide a method and apparatus for treatment of unsightly subcutaneous blood vessels which obviates the above disadvantages.

According to a first aspect of the present invention, there is provided an apparatus for treatment of subcutaneous blood vessels comprising means to generate ultrasonic vibrations, ~~means to focus said ultrasonic vibration at a point within tissue, and means to move said~~
focal point.

Preferably said means to focus said ultrasonic vibration at a point within tissue comprises a lens.

The lens may be plano-concave.

The lens may be disposed immediately adjacent the generation means.

The lens may be so mounted that the effective focal length thereof may be adapted to give a focused beam which can impinge directly on the vessel to be treated.

Means to hold the lens means may be movable with respect to the tissue within which lie the blood vessels to be treated.

According to a second aspect of the present invention, there is provided a method of treatment of unsightly subcutaneous blood vessels comprising the steps of providing an apparatus as described above, applying said apparatus to tissue within which lie the blood vessels to be treated, and moving said ultrasonic generation means and converging lens so

that its effective distance from to the tissue within which lie the blood vessels to be treated is such that the focal point of the lens is coincident with the vessel to be treated.

An embodiment of the present invention will now be more particularly described by way of example and with reference to the accompanying drawings, in which:-

Figure 1 shows schematically a system for generating high intensity focused ultrasound; and

Figure 2 is a cross-sectional view of an apparatus utilising high intensity focused ultrasound for targeting onto a selected blood vessel.

Referring now to the drawings, a piezoelectric ceramic disc 1 is adapted to produce high frequency ultrasound in the 1-5 MHz range when excited at an appropriate frequency by electrical means (not shown). Immediately adjacent to the piezoelectric ceramic disc 1 is a focusing plano-concave lens 2 of aluminium alloy or other suitable material, whereby the ultrasonic vibration is directed to a focal point 3 within the tissue wherein are located the blood vessels 4 to be treated.

The focal point 3 may require to be moved to take account of the depth of the blood vessel 4 within the tissue, so that the focal point 3 of the ultrasonic vibration coincides with the vessel 4. This is achieved by moving the assembled piezoelectric disc 1 and lens 2 either towards or away from the surface of the tissue. Movement is determined according to the formula:

$$F = h+t$$

Where f is the focal length of lens 2;

T is the depth of the target vessel 4 beneath the tissue surface; and

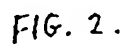
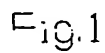
H is the height of the lens 2 above the tissue surface.

Since f is a predetermined constant, for any variation in t , h must be changed.

~~The assembly of piezoelectric disc 1 and lens 2 is mounted to an inner holder 5 which is itself~~

held to be longitudinally movable with respect to an outer holder 6. A container 7 surrounds the outer holder 6 and is provided with a seal 8 to engage sealingly the tissue surface. The container 7 is adapted to hold a coupling fluid medium 9, at least filling that part of its volume separating the lens 2 from the tissue. The medium 9 is preferably a gelatinous or aqueous liquid capable of transmitting the ultrasonic vibrations between the transmitting head and the tissue. A second seal 10 is provided between the relatively movable inner holder 5 and outer holder 6

As may be seen, use of the invention enables direct absorption of substantially all generated ultrasonic vibrations at a target point within tissue. This direct absorption of ultrasound in the 1 – 5 MHz range will cause the temperature of the relatively small volume of the target tissue to rise rapidly, which will cause local coagulation of the vessel 4. Such treatment, when applied over an area of a visual skin blemish, should remove the offending blemishing vessels and improve the appearance of the area.



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